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BRITISH ASSOCIATION OF GAS MANAGERS.

EIGHTEENTH ANNUAL MEETING.

PAPERS READ.

(VIII.)

IS THE REMOVAL OF THE DIP DESIRABLE?

By Mr. CHARLES GANDON, of the Crystal Palace District Gas Company.

The question asked by the title of this paper forms one of the subjects upon which papers or communications have for several years been invited by the Committee of the Association, but these invitations do not appear to have met with many responses, as during the last ten years only two short communications—one by Mr. W. Richards, and the other by Mr. W. L. Copp—have been recorded in the Transactions, and these, not having been read at the meetings, were not discussed. It is true that the question of working without dip-pipes has been at times referred to in papers upon other subjects, but having in this manner occupied only a minor position in such papers, it has not received much attention, or elicited much information or discussion.

Notwithstanding the silence which has been maintained on the subject, it is one that has attracted, and still continues to attract, the attention of many gas engineers; and, numerous devices having been introduced for the removal of the dip, or for the total abolition of the hydraulic main, it may fairly be expected that much additional experience and information has been obtained, which should render it possible to decide whether the continued use of the dip is desirable. There are many works where anti-dip arrangements have been used for a considerable time; and as, where they have been adopted, they have in most cases been continued in use, there seems reason to suppose that they have been found successful.

At the risk of repeating what is perhaps familiar to all members of the Association, it may be useful to state in a few words what are the advantages and the disadvantages of the hydraulic main and dip-pipes. They form a perfectly automatic means of preventing the back-flow of gas or admission of air when the retorts are open for charging or out of use, for which purpose no more simple and efficient means could well be devised; and were it not attended by certain disadvantages, we might well rest satisfied to retain it in some one of its present forms. The objections made against its use are that a pressure is thrown on the retorts, by which the evolution of the gas is retarded, and carbon deposits formed in the retorts, at the expense of some of the light-giving constituents of the gas; and also that, in consequence of the gas having to bubble up through the tar in the hydraulic main, a further portion of the valuable hydrocarbon vapours are retained in the tar.

With regard to the pressure in the retorts due to the hydraulic seal, it is argued by some that where exhausters are used the pressure may be reduced to a minimum, if care is taken to reduce the seal of the dip-pipes to the lowest point consistent with safety; and that when this is done the pressure is so slight that it can have little or no injurious effect within the retorts. If it were possible to keep this pressure at a minimum without variation, this view would probably be correct; but if a pressure-gauge is applied to a retort or ascension-pipe in action, it will be found that, even with a perfectly steady gauge at the exhauster, the oscillations within the retort, due to the constant changes of pressure, are very considerable. In a paper read by Mr. Forstall at a meeting of the American Gaslight Association in 1877, he mentioned that he found the oscillations occurring within the retorts with 1¼-inch seal in the hydraulic and 1 inch vacuum at the exhauster, were, at certain parts of the charge, from a vacuum of 3¼ inches to a pressure of 3½ inches, or a range of 7 inches, and my experience fully bears this out; but the extent of the oscillations varies at different times of the charge, according to the rapidity at which the gas is being generated, and also according as the main is charged with tar or liquor. These oscillations are probably caused by the gas forcing its way through the tar or liquor, and possibly also by the diminution in bulk consequent upon the rapid condensation of the tarry vapours. They may be diminished by reducing the depth of the seal and by keeping the main charged with liquor; but so long as the dip-pipes have any seal, there will always be oscillation to some extent.

Many engineers claim to have succeeded in drawing off the tar from the hydraulic main as it is formed; but, although I have tried various plans for effecting this, they have only been partially successful, and with none of them could a steady gauge be maintained within the retorts. Stopped pipes and thick tar in the mains may in some cases be due to the description of coal used, but the extent to which they occur depends chiefly upon the temperature of the retorts, for it is well known that, where low heats are employed, stopped pipes are of rare occurrence; in fact, they were almost unknown in the days of iron retorts.

A further inconvenience attending the use of dip-pipes is the difficulty of ensuring that they shall all have the same depth of seal. Slight variations will unavoidably occur in fixing them, but these are frequently much increased by the mains getting out of level when in use. Where the mains are supported on the retort-benches, as is usually the case, the former are sure to get out of level from the unequal contraction and expansion of the brickwork, and not unfrequently by settlements also. I have seen instances where there has been a difference of 6 or 7 inches between the levels of the two ends of a main serving for three beds of retorts, and it is easy to imagine that such an increase of pressure in some of the retorts must have an injurious effect. Also with through retorts, where each retort is connected with two separate mains, the slightest difference in their levels or in the depth of seal in the dip-pipes will cause all the gas to pass up one pipe, a portion of it travelling the whole length of the retort; and even if the seal of the dip-pipes is equal, the gas would pass up one of them only if there were a difference in the consistency of the tar in the two mains. If, then, it is admitted that the pressure within the retort may vary from any or all of these causes, it seems that it would be desirable, if possible, to remove all pressure at this point.

That the illuminating power of gas suffers from prolonged contact with tar is now very generally admitted, but it may be doubted how far the momentary contact due to its bubbling up through the contents of the hydraulic main is prejudicial, especially considering the high temperature of both the gas and the tar; in fact, it might almost be supposed that at these high temperatures, some of the

volatile hydrocarbons would be taken up from the tar by the gas, and several proposals have been made to enrich the gas by similar means. At all events there does not appear to be any experience to prove that the gas suffers in quantity or quality from this cause.

It is not the object of this paper to describe the numerous plans that have been introduced for dispensing with the seal in the hydraulic main, but rather to give a short account of the results of trials at my own works made for effecting this purpose in the hope that others who have been labouring in a similar direction may also record their experiences of the results obtained.

In my own case, in deciding upon the plan to be tried, it was not considered advisable to abolish the hydraulic main entirely, partly on account of the large outlay that such a change would have involved, and partly on account of the uncertainty of the success of the experiment; so that, in case of failure, the hydraulic seal could be again used without trouble or expense. Also, on account of the tendency to stopped ascension-pipes and thick tar in the mains, it was thought advisable to avoid any hydraulic valves or means for opening and closing the ends of the dip-pipes by the aid of the tar or liquor in the hydraulic main; and, on account of the danger of stopped pipes, any inaccessible valves in the ascension or dip pipes were avoided. Further, it was intended that the means for establishing or shutting off connection between the retorts and hydraulic mains should be solid, and not liable to damage by rough usage, easy of access, and, so far as possible, self-acting. The plan adopted consists mainly of a combined bridge and dip pipe, with two ends on the hydraulic main—one end acting as an ordinary dip, sealed within the main; and the other terminating at the top of the main, and allowing the gas to enter it without passing through the seal. This latter is closed by a heavy ball-valve, the spindle from which passes through a stuffing-box in the cover, and is worked by a lever and rod in connection with the cross-bar of the mouthpiece. The stuffing-box is packed with asbestos fibre, lightly put in, so as to be sufficient to prevent escapes at the low pressure in the pipes, and to allow of the ball-valve falling by its own weight when the rod is released from the cross-bar of the mouthpiece. When the retort is closed and in action, the ball-valve is raised, and, the valve being open, the gas passes direct into the hydraulic main. When the retort is opened for charging, the ball falls by the rod being released from the cross-bar, and the ordinary hydraulic seal is established. The ball has to be lifted by hand, and the rod hooked on to the cross-bar, when the retort is charged, to re-establish the free passage; but should this be neglected, the only inconvenience is that the gas has to pass through the dip-pipe, so that no excessive back pressure can arise in the retort, and the man in charge can see at a glance if any of the valves have been left so shut.

The whole of the retorts in one house at Sydenham (252 mouthpieces) have been used for the last two years with these anti-dip arrangements, but as they have to be worked by the same exhauster in connection with other houses where ordinary dips are used, it was necessary to have some means for adjusting the pressure so as to work the anti-dips with, say, 2-10ths pressure while maintaining a vacuum of from 10-10ths to 15-10ths with the ordinary dips. This was effected by fixing a bye-pass with throttle-valve and governor to the outlet main from the retort-house, so that, by partially closing a valve in the outlet main between the inlet and outlet of the bye-pass, any desired pressure may be maintained. This has been found to work so well that similar bye-passes are now being fixed to the other houses, so as to regulate the pressure or vacuum at pleasure.

It was anticipated that, by dispensing with the dips, fewer stopped pipes would result; but, at least at the commencement, quite the reverse was experienced, and the number of stopped ascension and bridge pipes became a source of considerable inconvenience and loss, thereby neutralizing to a great extent any advantage to be derived from dispensing with the seal. It was found that the temperature of the gas in the hydraulic mains where the anti-dips were used was considerably higher than in those with the ordinary dips—ranging from 180° to 190° Fahr. with the anti-dips, as compared with 140° to 150° Fahr. in the latter; and this increased temperature, affecting also the ascension-pipes, was probably the cause of the more frequent stoppages. It seems certain that at whatever temperature the retorts may be worked, the temperature in the hydraulic main is higher when there is no seal for the dips. This may be due to the gas passing more quickly from the retorts; but, although at first considerable inconvenience was experienced from the more frequent stoppages, further experience has proved that it need not form an obstacle to the abolition of the dips, if we can rest satisfied to work with moderate heats.

As these anti-dips were used for the most part in conjunction with ordinary dips, it has not been possible to make accurate observations of the results obtained with them extending over any lengthened period. They have been in use for over two years, during the first four months of which time they were worked alone, and an accurate account kept of the coal used, the result being a production of 10,610 cubic feet of gas per ton and 6200 feet per mouthpiece in 24 hours, as compared with 10,100 cubic feet per ton and 6000 cubic feet per mouthpiece obtained with ordinary dips, notwithstanding more frequent occurrence of stopped pipes. The increased make of gas thus shown cannot be claimed as clear profit, as, in addition to the extra labour with stopped pipes, the retort mouthpieces were so shaken by pipe-jumping that, after nine months' work, it was found necessary to take them all off and refix them, and the hydraulic mains were so filled with hard pitch that all the fittings had to be taken down and the mains cleared out. That this state of things need not necessarily occur from the use of anti-dip arrangements, has been proved by the experience of last winter, when the same retorts were worked at lower heats with a marked decrease in the number of stopped pipes; and records kept during the last few months show the proportion of stopped pipes with the anti-dips to have been only one-third of that where dips were used.

An opportunity lately occurred of noting carefully, during 14 days, the results obtained with the use of the anti-dips exclusively, with moderate heats. With twelve through benches of retorts (or 168 mouthpieces) the results were—

Average make of gas per ton	10,442	cubic feet.
Do. do. per mouthpiece .	6,093	,,

During these 14 days there were no stopped pipes; in fact, no stoppage in the pipes of these twelve benches has occurred since the 14th of May up to the present time. The illuminating power averaged 15·68 candles with a mixture of Ravensworth Pelaw and Dean's Primrose coals and about 3 per cent. of Hucknall cannel, the weight of coal used being carefully recorded. These results may not be considered satisfactory by the advocates of high heats, short charges, and mechanical stoking; but they show an improvement of between 300 and 400 feet per ton as compared with former working, and it is also to be observed that the retorts, although in good condition, were in their second year of working; so that no advantage was obtained from new plant, and no special care was taken in working. The most satisfactory point was the entire absence of stopped pipes, which I attribute solely to moderate heats being maintained, as with the same retorts and higher heats the stoppages were very frequent.

With reference to thick tar, or pitch, in the hydraulic main, I know that many engineers have been able to remedy its accumulation; but I must confess that, with the exception of avoiding high heats, all the plans I have tried have partially failed. During the past winter means were provided for drawing the tar off from the bottoms of the hydraulic mains, and running a stream of liquor into them. Holes were cut in the under sides of the mains, at the middle of each length, and to these holes boxes were fixed, with overflows slightly below the gas outlets, so that the tar was, or should have been, drawn off into a separate main, liquor being also allowed to flow in at the end of each main. This was partially successful; but, on examining some of the mains after the retorts had been put out of action, pitch was found at both ends of the mains, although towards the centres, at the tar outlets, the mains were comparatively free from it.

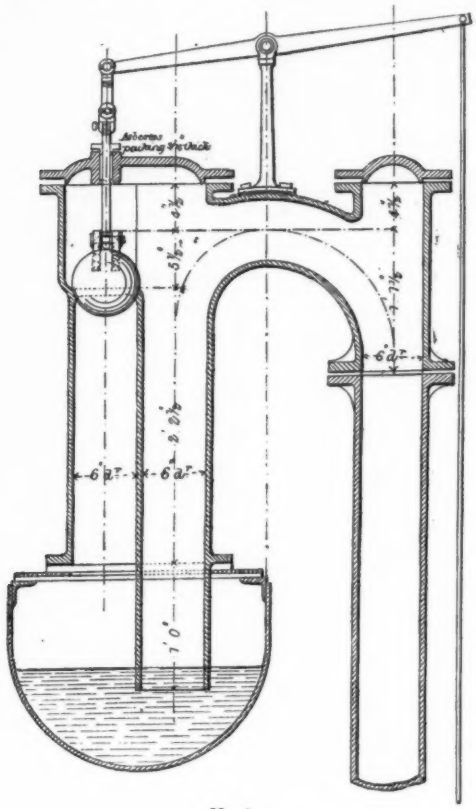
It may perhaps be asked whether the illuminating power of the gas was diminished or increased by working without dips. To this I cannot give any positive answer, except that no sensible difference has been observed, and no difficulty has been found in maintaining it at the usual standard, whether working partially or entirely without dips, and while using the ordinary coal. The deposit of carbon on the retorts has sensibly decreased, to the extent probably of one-half.

If the results of two years' working with these anti-dips have not conclusively proved the advantages to be derived from their use, or that they are the best means for dispensing with the hydraulic seal, they have at least been sufficiently successful to induce me to persevere with them, and to endeavour to overcome the defects and inconveniences that have been discovered in using them. These appear to depend mainly upon the avoidance of thick tar and choked pipes, and if these can be reduced to a minimum, I feel confident that improved results may be obtained by dispensing with the dip.

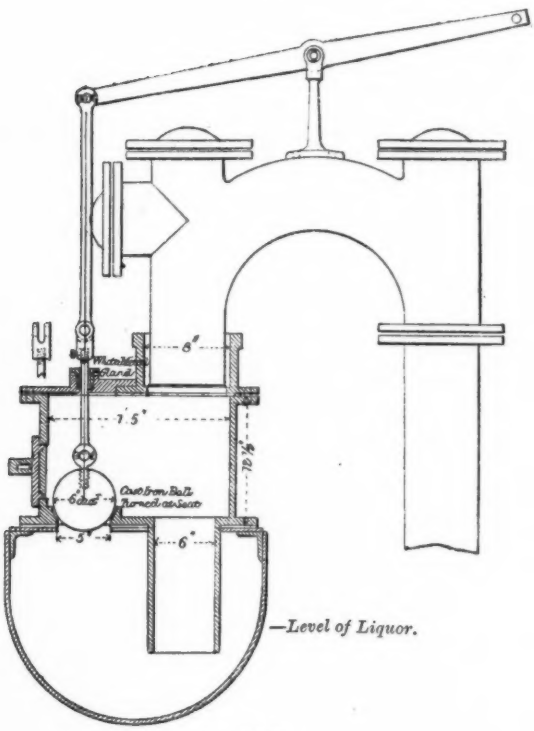
The ball-valves, when not too much clogged with pitch, have worked satisfactorily with 2-10th spressure in the hy-

draulic main. A small back-flow of gas occasionally occurs when charging, but this is not of frequent occurrence, and can be generally stopped by raising and letting the ball fall once or twice; but it is certain that the solid construction of these valves and their easiness of access are of great importance, for if they had been of delicate construction they must have been inevitably rendered useless by the frequent collections of pitch on them. It is almost needless to point out the necessity for working with a slight pressure in the hydraulic when no dips are used, for should a vacuum occur, in addition to the risk of air being drawn into the gas, there would be danger of explosions occurring if any of the retorts are open for charging and the valves are not perfectly closed. A pressure of 2-10ths of an inch has been found sufficient to avoid this, and with the bye-pass governor as described, it has been easy to maintain this pressure constant.

In submitting these few details on the subject, I cannot claim to have proved conclusively that the removal of the dip will be attended with any great advantage. If by its abolition an increased make of 300 to 400 cubic feet per ton can be obtained, and less carbon deposit on the retorts, with probably less consequent wear and tear, I think it is a matter deserving further attention. At the same time the make of gas per ton, in ordinary working, is liable to be influenced by so many causes that, without further experience, I am not prepared to assert positively that the increases recorded have been obtained solely by means of the anti-dips. If, however, my remarks result in obtaining the experience of other members, some useful information may be derived, and the object of this paper will have been accomplished.



No. 1.



No. 2.

[*Of the above illustrations, No.* 1 *is the arrangement more particularly referred to in Mr. Gandon's paper. No.* 2 *was a modification adopted to obtain more ready access, in case of the pipes becoming choked with pitch; and also to admit of the old bridge-pipes being used instead of having new ones cast. The principle is, however, the same in both.*]

(IX.)

STOPPAGES IN ASCENSION-PIPES.

By Mr. D. Ford Goddard, of Ipswich.

It is with much hesitation the writer again brings before you this subject, which has been so many times treated of, and so much discussed at previous assemblies; but as, notwithstanding all that has been written and said, it still is not at all infrequent to hear sore and bitter complaints of invasions by this most dire enemy—which so completely damages the results of the otherwise good work of the retort-house, and which renders the life of the gas manager a perfect purgatory of anxiety and misery—it may not be wasting the valuable time of the Association if once more, in a very brief way, the grievance is ventilated, and its causes, effects, and possible remedies inquired into. It may be, and doubtless is so, that there are managers present who know but little of this evil spirit which plants itself in the ascension-pipes, and imperatively lays down the law to the aspiring gas: "Thus far shalt thou come, and no farther." Happy men! Be generously patient, and forbear while those who have suffered and are suffering from this black blockade relate their sad experiences, and seek a means of relief.

At this time is it especially well to be prepared for all emergencies, when gas managers' thoughts are running on reverberatory furnaces, mechanical stoking, desperately high heats, 10,000 or even 12,000 cubic feet of gas per mouthpiece, and other almost revolutionary advances in the science of gas making; for, unless due precautions are taken, these will not prove unalloyed blessings. Two or three years back, with a view to improved carbonizing results, West's mechanical stoker was adopted at Ipswich. This naturally brought in its train greatly increased heats, four-hour charges, and from 6000 to 7000 instead of from 4000 to 5000 cubic feet of gas per mouthpiece. It shortly also brought the following results, not nearly so pleasing:—Gas blazing round the mouthpieces of the retorts; the lids frequently opened to allow of the insertion of an auger into the ascension-pipes, hopelessly seeking to force a passage through the dense and sticky mass therein contained; ultimately the removal of the top caps, and a furious assault with a long and heavy poker, by a man seated astride the bridge-pipe; and the opening of the hydraulic mains for the purpose of digging out the pitchy contents which would not flow therefrom. All these unpleasant operations, being well-nigh continuous, necessitated the employment, throughout the winter of 1879-80, of a large gang of men, day and night, popularly known as "pipe-jumpers," whose sole duty it was to keep the ascension-pipes clear; and besides this expense there was also that of keeping about 20 per cent. more retorts under fire than should have been required.

On hearing these statements, the first thought would probably be that the retort-house was badly constructed, that the pipes and hydraulic mains must have been very small, and placed close to the retort-stack. It may therefore be well to say that the retort-house was quite new, fitted with eleven through beds of six retorts in each, built in stout arches with Morton's lids; on either side of the stack ascension-pipes 6 inches in diameter, the shortest—that is, those from the top retorts—rising 12 feet; for each set a separate hydraulic

main of large dimensions and ⊽ shaped, with a species of well arrangement supposed to draw off the thick tar, the bottom of the hydraulic being 3 feet above the top of the stack. Surely every precaution had been taken to prevent stoppages; but not a month of work had been completed before the results described declared themselves. The writer is happy to be able to add, however, that in the winter of 1880–81 no extra man was employed in the retort-house; not a single top cap was removed, and not one ascension-pipe was blocked, although high heats were maintained, and the make of gas averaged as nearly as possible 7000 cubic feet per mouthpiece. It was more particularly to explain how this was effected that the writer ventures to offer this short paper.

There can be little doubt that the cause of blocked ascension-pipes is mainly to be attributed to high heats. This must be evident to all who have suffered, as experience must have shown that a lowering of the temperature of the retorts serves at once to diminish the number of blocks, and ultimately to dispose of them altogether. It were useless to argue against the use of high heats, the opinions of the present day being rather in favour of increasing than diminishing heats (nor would the author's own convictions lead him to do so); but the almost certainty of producing stoppages makes the adoption of reverberatory furnaces, with their attendant high heats, a very grave question.

High heats produce two effects which tend to blocked pipes and hydraulic mains—first, a much more rapid evolution of gas; secondly, a distillation by which the more volatile constituents of the tar are driven off, leaving behind the residual pitch. The rapid evolution of the gaseous properties of the coal tends to carry with it the finer and lighter particles of the coal itself. Especially is this the case with a coal that is dusty, brittle, and slakes easily. Hence the kind of coal to use does enter into the question before us; but it also causes those considerable variations in the temperature of the ascension-pipe which so much promote the alternate distillation of the tar and solidification of the pitch. It would be folly to take up valuable time by going into the matter of temperature, which has been so recently and exhaustively set forth in the pages of the JOURNAL OF GAS LIGHTING, from the pen of Mr. Forstall, of New Orleans, except to remark that whereas he found the pipes from the upper retorts to be the most troublesome, the author has invariably found those from the bottoms and middles to be so. Another effect of high heats is the thickening of the contents of the hydraulic mains, and a consequent accession of pressure in the retorts; thus the gas, not being able to get away as quickly as made, is subjected for a longer period to the varying temperatures of the ascension-pipes.

Many are the suggestions that have been made to overcome these difficulties. Thus the admirable plan was described by Mr. Green, some years ago, of placing in the mouthpiece a grate with shelves, and this is undoubtedly serviceable in detaining much that would otherwise be carried into the ascension-pipe, and there stay till removed by forcible means; but besides giving some little extra trouble to the stokers, where a large number of retorts have to be charged, it altogether fails to deal with the hydraulic main pressure. Another suggestion was for a bowl of water to be placed in the mouthpiece under the ascension-pipe, in order that the steam arising from it should ascend the pipe and keep everything soft. Apart from the manifest objection of having to remove, refill, and replace this bowl amidst the bustle and activity of drawing and charging retorts, the bowl will usually be found full of pitchy tar which has dropped from the pipe, and sometimes even red-hot, and in both cases without any water left. It was thought by some that if the ascension-pipes were surrounded with a water-jacket they would be greatly protected against the heat radiating from the stack; others have coated the pipes with some non-heat-conducting composition, to gain the same result. But in the one case there is great danger of cracking the ascension-pipes themselves by the too liberal use of cold water, and in the other there is the greatest difficulty in keeping the composition from peeling off the pipes, and so exposing some places more than others.

The writer has tried all these, and found them but partial successes. He has also tried blocking the through retorts in the middle with a 9-inch wall, to avoid the danger, which certainly does sometimes occur, of all the gas rising through only one ascension-pipe, and thereby unduly heating that pipe. This has yielded one advantage. It was possible with two ascension-pipes to have one completely blocked up, and not to know anything about it until the second one became so too, when it was usually found necessary to take down the first blocked pipe altogether, so hard had become the obstruction; whereas with single ascension-pipes the accustomed eye will easily recognize symptoms of blocking, and an early attention to it may save much after-labour. The adoption of some anti-dip scheme did look hopeful, and was to a certain extent beneficial; but, besides requiring the most careful driving of the exhauster, it was not by any means a complete remedy.

Success, however, has been at last attained, if nine months' work is evidence of success, by the combination of two plans of the simplest character. The first was to run off completely the contents of the hydraulic mains every other day, or even every day if needed. This is effected through two cocks placed in the bottoms of the mains, and leading into the tar-main. It is managed entirely by a lad, who, after having emptied, refills from a pipe leading from the ammoniacal liquor tank. It is done very quickly in between the charges, and the consequence is the lightest possible seal of the dip-pipes at all times; and this is, in the writer's opinion, even better than no seal at all.

The effect of this simple operation was immediate. There was a great relief from stoppages, and only now and then some pipe from a bottom retort would block at the bend. Into these was screwed, near the top, a short ¼-inch syphon-pipe, having on its outside end a small cup, into which water was constantly dropping. Thus there was a regular but slow drip of water into the obstructed pipes, keeping everything in the pipe soft, so that when the auger was used it rattled against the inside of the pipe as against clean iron. The object of supplying the water in this external way, instead of directly to the inside of the pipe, is simply that by this means any one can see the quantity of water being used, as it is important there should not be too much.

This has proved an extremely simple and inexpensive way of overcoming a great nuisance. The cost of pumping the liquor up to a sufficiently high reservoir is not much of an extra, as it has to be so pumped for use in the scrubbers, and the lad who sees to the duties is usually employed elsewhere for the greater part of the day. The writer has the fullest confidence in recommending to gas managers these few suggestions, in case they may be attacked, as he has been, by this insidious foe.

Discussion.

Mr. A. EDWARDS (Taunton) asked the dimensions of the retorts used by the two experimenters.

Mr. W. PARLBY (Sheffield) said he would like to ask Mr. Gandon if he had experienced any ill-effects from the use of the anti-dips in the wear and tear of the retorts. The diminution of pressure in the retorts, and the removal of it to so low a point as 2-10ths, would, he thought, in actual working, be found to incur considerable risk; as the working pressure in the retort was known to vary at the different stages of carbonization. It was clear to all practical managers that the "back pressure," as it was commonly called, of the apparatus between the gasholders and the hydraulic main should be removed entirely, and the pressure of gas in the retorts themselves diminished to as low a point as possible, without injury to the soundness of the retorts. Mr. Gandon had intimated several advantages in his later experiments, arising from the use of anti-dips, such as the absence of stopped pipes, which, by the way, might be regarded as a remedy for the evils referred to in the subsequent paper under that head. There was also said to be a yield of 300 cubic feet more gas per ton, and less carbon formed in the retorts, while at the same time the illuminating power of the gas was maintained. These were doubtless very important advantages, and it was in the interest of the profession and of gas undertakings generally that the use of the anti-dip should be further investigated.

Mr. W. MILES (Clitheroe) thought it would be rather difficult for the gentlemen who had read these papers to reconcile their views on one or two points. Mr. Gandon, previous to using anti-dip pipes, was content to obtain 6200 feet of gas per mouthpiece, and thought it excellent work; but he was now willing to reduce the quantity to 6093 feet. On the contrary, Mr. Goddard told the meeting that he was now obtaining a yield of 7000 feet per mouthpiece. He should like to know what kind of coal they used, and what was the size of the retorts. Mr. Goddard said the moment he commenced using West's apparatus he began to experience the difficulties of stopped ascension-pipes. He (Mr. Miles) hoped he did not mean that West's apparatus was conducive to so undesirable an effect. He had hoped to have heard from Mr. Gandon more conclusive proof of the advantages of the anti-dip.

Mr. S. Hunter (Salford) said this question had often come before the Association somewhat in this form: Was it practicable, advisable, and profitable to use the anti-dip? From his own experience he could speak as to two of these points, and say that it was practicable and desirable; but as to being profitable, the fact that he had to work the anti-dips with other settings prevented his making any definite statement on this head. Perhaps Mr. Gandon could give some figures as to profit, he having answered all the questions in the affirmative. His (Mr. Hunter's) own experience of the anti-dip extended over nine months; and, from the first day of starting, up to the present, they had not had one moment of uneasiness or difficulty. It was worked with the greatest freedom. Another advantage—that of relieving the retorts from pressure—was noticeable on the retort-lids. At Salford the new settings were fitted with Morton's lids, from which there was not the slightest escape of gas. In reference to the other paper, they were much obliged to Mr. Goddard for giving such a simple remedy, which could be easily and inexpensively applied.

Mr. J. West (Manchester) said Mr. Goddard was not the only one whom he had caused a little trouble, for many others had been placed in difficulties when they commenced using his (Mr. West's) apparatus. It could be easily understood why this should be so, for in turning from an old system to a new one, any one who commenced to work with high heats, whether he adopted his (Mr. West's) system or not, would undoubtedly—unless he used some such means as Mr. Goddard suggested—get into difficulties. If they intended to get a large yield of gas of high illuminating power from the coal, they must use precautions, which were well worth a little extra supervision throughout the works. Perhaps no one had met with more difficulties than he (Mr. West) had. He was one of the first to advocate, and prove that high heats were beneficial; and he had gone through and experienced all the difficulties indicated in the paper, but had been able to surmount them all. It could be done by removing the tar, as condensed, from the hydraulic main; but the chief advantage would be derived by a steady working of the exhauster, with a slight pressure in the retorts. It was necessary, in working high heats (assuming they were also using anti-dips), to have a steady exhauster, and work with from 2-10ths to 4-10ths pressure in the retorts so as to keep them perfectly tight. He was under the impression that there was something more than Mr. Goddard had indicated. In fact, he was not himself satisfied that it was really the case that coal dust was drawn up the ascension-pipes. He could hardly see how this could occur when working with a pressure in the retorts; but he did think there was combustion going on sometimes in the ascension pipes, arising from the admission of air through some of the fissures of the retorts or round the mouthpieces. He had worked the anti-dip with half an inch vacuum in the retort for one day, and during this time he could very readily stop 50 per cent. of his ascension-pipes; but if he reversed the order of things, he found that he relieved himself of the difficulty. In all these matters constant and regular attention was required. The auger should be driven up the ascension-pipe at the end of every charge. Only a small auger need be used, and if the stokers did this systematically, and there was the stated pressure in the retort, there would be very little difficulty from stopped pipes, unless the manager went to the extreme of getting too great a volume of gas out of the coal. In the course of his experience he had been connected with gas manufacture, both in the Midland and Southern districts, and found that a great difference arose from the kind of material used. During 15 years in the Midland Counties, when using Inland coal, which contained more moisture, he scarcely knew what it was to see a stopped pipe; but when he went to the South, and had to use Newcastle coal on the old system, he was continually bothered with it.

Mr. R. O. Paterson (Cheltenham) did not agree with Mr. West that he was one of the first to advocate high heats; for he had been advocating them for many years before Mr. West mentioned the matter, and other gentlemen in the room had done the same. Coming, however, to the subject of the papers, in his opinion the cause of stopped pipes was not so much a question of high or low heats, or the use of one kind of coal or another; the chief cause in his (Mr. Paterson's) opinion was working the charges for too long periods. With a low heat, and allowing the charges to run too long, pipes would get stopped just as readily as with high heats.

Mr. R. Morton (London Gas Company) remarked that Mr. Gandon said when he adopted the anti-dip he obtained a great increase of temperature, but subsequently this was reduced. He wished to know whether the distance from the mouthpiece to the hydraulic main was the same in each case. For the past twelve months he had been working a large number of retorts with only one ascension-pipe, and working 4-hour charges without the slightest difficulty.

Mr. W. J. Warner (South Shields) thought one great cause of stopped pipes was working the charges too long; the large volume of gas given off with a fresh charge carrying with it small particles of coal dust, which were deposited in the insides of the ascension-pipes. He also had been troubled with stopped pipes, and was somewhat relieved from the difficulty by forcing ammoniacal liquor into the hydraulic main, which had been done by the superintendent. At the other station of his Company, at Jarrow, the same trouble had occurred, but not from the hydraulic. The superintendent tried a small stream of water flowing down the inside of the pipe, but this had not been found to have much, if any influence.

Mr. G. B. Irons (Gosport) regretted that Mr. Darwin was not present, for he believed he had experienced the same results as Mr. Goddard had described; but two years ago, when he (Mr. Irons) visited his works, he saw that the whole of the trouble had been remedied, and he believed the means Mr. Darwin adopted were similar to those just described by Mr. Goddard.

Mr. E. Bryan (Beverley) asked if steam had been tried in the mouth of the ascension-pipe. He had found a jet of steam had been very useful.

Mr. W. Carr (Halifax) said he had been trying anti-dips for about two years, and his experience was precisely similar to that of Mr. Goddard and Mr. Gandon, that wherever high heats and anti-dips were used precautions had to be taken against stopped pipes—in fact, there was a great increase of stoppages in the ascension-pipes. One point he (Mr. Carr) noticed was that whenever they had all the apparatus new and clean they could go on for three or four weeks with comparative immunity; but when they had been at work a little while they began to get the pipes occasionally stopped, and by degrees more and more frequently. Therefore the fact of keeping the apparatus clean and the hydraulic main in a fairly workable condition had a great deal to do with the question of stoppages in ascension-pipes. He could hardly accept the idea that any particles of coal, however fine they might be, were drawn up the ascension-pipes, nor could he accept the statement of Mr. West that there was any combustion going on in the ascension-pipes. There could be no combustion without ignition, and if the temperature was only 190° Fahr., he knew of no product that would come from gas coal which would ignite at so low a temperature. No doubt there was a certain amount of distillation going on, and if any tar were deposited on the side of the pipe it would distil gradually and slowly until a very hard and solid residue of pitch was left which would accumulate, and, in his opinion, account for the stoppages being more frequent in the course of time. He thought the Association was indebted to the writers of the two papers for the very practical way in which the subjects they dealt with had been treated.

Mr. R. P. Spice said he had listened to the two papers with uncommon pleasure, they being so very practical in their character; while the subjects of the two were so intimately connected that they might be regarded as one. He felt that he could be "happy with either," were "t'other dear charmer away." It was especially gratifying to find a young man like Mr. Goddard coming before the Association in so thoroughly sound a style. It was encouraging to the younger members of the profession who were present, and those who might not be listeners. He (Mr. Spice) considered that Mr. Goddard had earned a title to their warmest gratitude for the suggestions he had made, and especially the one with which he concluded his paper. He (Mr. Spice) had suffered greatly in former times from choked ascension-pipes, but had lived to overcome these difficulties. In fact, he had lived to enjoy the luxury of dispensing with such antiquated things as dips and hydraulic mains, and was no longer indebted to one or the other. But although he had arrived at this pitch of perfection, it was not owing to his own ingenuity, but to the inventions of others which he had adopted. He felt, however, that the practical suggestions made in the papers would be valuable while these adjuncts to gas making continued in general use.

Mr. Gandon, in reply to the discussion, said that he had hoped the remarks on his paper would have induced other members to give more details of their experience with the use of anti-dips. With regard to the size of his retorts, they were oval, 20 feet long and 21 in. by 15 in. He considered

6000 feet of gas per mouthpiece the normal make with the heats at which they generally worked, and he did not think it likely that by abolishing dips the make per mouthpiece would be greatly increased. It could be increased, of course, by working at higher heats, or with 4-hour charges. With regard to the question of wear and tear, he anticipated it would be less without dips. There was unquestionably less carbon deposited on the retorts, and consequently they required less scurfing, which was always injurious; but he could not say whether the wear and tear would be otherwise affected, because the retorts had not yet been sufficiently long in use. One gentleman had slightly misunderstood his figures. The average make of gas was 6100 feet per mouthpiece when using dips. It was about the same without the dips, and he had already said that he did not anticipate any greatly increased make, but it was also to be observed that when they obtained the average of 6093 feet per mouthpiece without dips they were working with lower heats than when they obtained 6100 feet with the dips. He found a pressure of 2-10ths quite sufficient for anti-dips. As to Mr. Morton's remarks on increased temperature, so far as his (Mr. Gandon's) observations had gone, if there were two hydraulic mains alongside each other, one of them working with dips and the other without, the temperature in the one where there were no dips would be greater than where the dips were used, although the temperature of the retorts might be the same in both cases, and he considered this was due to the gas passing from the retorts more freely than if it had to force its way up through the liquor.

Mr. GODDARD said his retorts were of two sizes, 21 in. by 15 in. oval, and 20 in. by 16 in. Ω-shaped. He used Hebburn's gas coal. He had not found anti-dips a means of preventing stoppages in ascension-pipes and hydraulic mains; indeed, some time ago he had a whole house completely fitted with anti-dips, and had been more troubled in this house than in any other. If the anti-dip were a complete system without any connection with hydraulic mains, it might then perhaps prove a preventive of the difficulty; but as it was generally used over an existing hydraulic main, he thought it did more harm than good, for the liquid in the hydraulic main was not disturbed or broken up by the bubbling of the gas through it, and became hot and thick, and settled. He hoped the idea would not arise that he attributed the blocked ascension-pipes to the use of West's mechanical stoker, as he would not be without it on any account. It was simply due to the increased temperature at which the retorts were being worked in order to get the most satisfactory results from the apparatus. No doubt where the machine had been introduced there was an increase of stopped pipes, simply because there was a larger quantity of gas brought off in four hours than previously in six. He tried for a long time an automatic arrangement for carrying the thick tar off from the bottom of the hydraulic mains without any attention; but he must say he found it fail, and therefore it was necessary to adopt some plan by which it was known that the hydraulic mains were completely emptied of their contents. He had at the bottom a quantity of pipes which were supposed to draw off the thick tar, and send it out beyond the valve regulating the dip; but he did not find them act at all, and therefore he was obliged to adopt the plan of opening the cock and running the contents completely out. An unsteady exhauster had, no doubt, something to do with blocked ascension-pipes; but it did not apply to his case, as for some time he had been working with an extremely steady exhauster. With reference to finding coal in the ascension-pipes, he had been driven to the conclusion that coal had found its way into them simply because he had seen coal there, or something so analogous to it that he could not tell the difference. There were certainly some small particles of something which looked extremely like coal. The argument that it was not so, on account of the pressure in the pipe, would not hold, because the flow of gas was stronger than the pressure. He had not tried the use of steam in the mouth of the ascension-pipe, although he had experimented with it in taking out the thick matter from the hydraulic main. He could not say he liked using it, as it was rather an inconvenient thing to have to do with in the retort-house.

READING CORPORATION WATER SUPPLY.—At the meeting of the Reading Town Council on Thursday last, the Water Committee presented an approximate statement, prepared by the Borough Accountant (Mr. R. Bradley), of the finances of the water department for the half year ending Lady-day last, from which it appeared that there was a clear profit, after carrying £1375 to the interest and sinking fund account, amounting to more than sufficient to pay the full annuities in respect of the half year.

THE SOUTH METROPOLITAN GAS COMPANY AND THE SLIDING SCALE.

As will be seen by our "Parliamentary Intelligence" to-day, the South Metropolitan Gas Bill was taken into consideration by a Committee of the House of Lords last week; and, after opposition of a certain kind, it was passed. Among the papers prepared in view of the inquiry were two by Mr. Livesey, of a very interesting character. One was a "Statement as to the Statutory Regulations and Financial Condition of the Company;" the other, "Observations as to the Origin and Object of the Sliding Scale, and the Proposed Reduction of the Initial Price settled in 1876." Both papers are somewhat lengthy; but the salient points of each we will endeavour to place before our readers.

The former, after giving the constitution of the present South Metropolitan Company, states that the district supplied by them is about 12 miles long, and on an average about 5 miles wide, comprising an area of 60 square miles. This area is very nearly as large as that of The Gaslight and Coke Company; but the district of this Company includes the City, the Strand, Regent Street, Oxford Street, &c., so that the consumption is about three times as much as that of the South Metropolitan Company. The latter Company, before the recent amalgamations, were charging for gas 3s. per 1000 cubic feet; the Surrey Consumers' Company, 3s. 9d.; and the Phœnix Company, 3s. 4d. In some instances these differences existed not only in the same parish, but in the same street, and were a constant source of dissatisfaction. On the amalgamation of the Surrey Company the price in their district was reduced from 3s. 9d. to 3s., and this reduction was equal to a rental of £20,000. On the amalgamation of the Phœnix Company the price in their district was in the same way reduced from 3s. 4d. to 3s.; this reduction being equal to a rental of £28,000. Last year the price over the entire district was 3s. per 1000 feet, but from the 1st of January in the present year it was reduced to 2s. 10d. This reduction, allowing for increased consumption, will be equal to a rental of £30,000. The three reductions are therefore equal to £78,000 per annum, and but for the sliding scale, which gave the Companies increased dividends, the amalgamation would not have been carried out, and the reductions could not have been made.

The statutory regulations under which the Company's operations are now carried on, governed as they are by the Act of 1876, are then set forth; and their capital powers are next dealt with. The authorized capital of the Company consists of—

Stock	£2,082,000
Loans	310,000
Total	£2,392,000
Amount called up to Dec. 31, 1880	1,951,490
Remaining to be called up	£440,510

On the amalgamation with the Phœnix Company, certain portions of their capital, which were limited to a dividend of 7½ per cent. as to one part, and 5 per cent. as to another part, were converted into equivalent amounts of capital entitled to 10 per cent. The total amount of capital called up, as given above, is therefore, on this account, £160,000 less than the amount actually received and expended, which was, in fact, £2,111,490. Loans in any form are limited to an interest of 5 per cent.; and the Company are required for every £50,000 raised by shares or stock to raise by loan an amount equal to three-fourths, or £37,500.

Under the head of revenue it is stated that the rental for last year was—

Public lights	£50,786 0 0
Private consumers	501,364 0 0
	£552,150 0 0
Receipts from other sources	192,986 9 8
Total revenue	£745,136 9 8

The reserve fund actually invested at the close of last year, and which is now required to be made up out of moneys applicable to dividend, was £184,126 12s. 2d.

With regard to the gas made and sold, it is stated that—

The gas made per ton of coals carbonized last year was	9,805 cub. ft.
Do. sold per ton of coals	9,251 ,,
Do. unaccounted for was at the rate of	5·6 per ct.
Total quantity made in the year was	3,796,525,413 cub. ft.
Do. do. any one day was	19,000,000 ,,

The coals carbonized last year were—

Common coal	375,043 tons.
Cannel	12,160 ,,
Total	387,203 tons.

The proportion of cannel to common coals was at the rate of 3·2 per cent.

The proportion of capital to the ton of coals for each of the three Companies before the amalgamation was as follows, viz.:—

South Metropolitan Company	£4 11 7
Surrey Consumers' Company	5 5 7
Phœnix Company	6 11 7

With the three Companies amalgamated it is £5 0s. 9d. This, as it is, is a very low rate, but as the consumption increases it will get lower and lower.

	Millions.
The gas sold in 1880 was	3545
Do. 1870 ,,	1898
Total increase in 10 years (being at the rate of 87 per cent.).	1647

The district of the Company is essentially a residential district. A considerable area of it is still uncovered, and several thousand new houses are built on it every year. In a large proportion of these new houses gas is taken.

To show the probable cost of extending the Company's works at any of their present manufacturing stations, it is said: "The Phœnix Company in 1864 obtained powers to purchase compulsorily 3 acres of land adjoining their works at Vauxhall, and by the time they had settled with the owners, lessees, and occupiers, and disencumbered the land for their own use, it had cost them £21,000 per acre; the Surrey Consumers' Company at a later period purchased by agreement about ½ acre adjoining their works, covered with warehouses, and by the time that was cleared it had cost the Company £18,000."

Upon the operation of the sliding scale as to dividend and price, and the sale of new capital by auction, the paper enters into detailed calculations. Premising that last year the price charged for gas was 3s. per 1000 feet, and the dividend paid was 11½ per cent., while this year the price charged is 2s. 10d. per 1000 feet, and the dividend, if it can be earned, will be 12 per cent., the following figures are given to show the effect of 1d. reduction of price, and 5s. per cent. increase of dividend:—

Last year the gas sold was 3545 million cubic feet, which at 1d. per 1000 was	£14,770
The capital (exclusive of loans) was £1,832,000, and 5s. per cent. on this was	4,580

The consumers, therefore, are now benefited by every 1d. of reduction more than three times as much as the Company. As the consumption increases every year in a very much larger proportion than the dividend-bearing capital, the consumers at every fresh reduction get not only a larger amount, but a larger and larger proportionate benefit than the Company. For instance:—

Taking a large figure for an illustration, it works out as follows:—

Nominal capital	£1,000,000
Premium 90 per cent. (as below)	900,000
Loans	750,000
Total	£2,650,000

£2,650,000 at £5 per ton of coals (the proportion that the capital of the Company bears to coals) would represent 530,000 tons.

530,000 tons of coal, at 9250 feet per ton (the quantity actually sold by this Company last year) would produce 4,902,500,000 cubic feet of gas.

4,902,500,000 cubic feet at 1d. per 1000 would give . . £20,427 1 8

This large sum would at the present standard represent a total income of about £1,000,000, and an increase of dividend at the rate of 5s. per cent. upon the nominal or dividend-bearing portion of the capital would only be 2,500 0 0

which would give the consumer more than eight times as much as the Company.

New stock of the Company was sold by auction in January of this year to the nominal amount of £30,000. The premiums, clear of expenses, received on this were as follows:—

"B" stock, £18,000, entitled (at the price now charged) to 11½ per cent.	£14,384 0 0
"C" stock, £12,000, entitled (at the price now charged) to 12 per cent.	11,016 0 0
Total premiums	£25,400 0 0
Total nominal capital and premium together	£55,400 0 0

The premiums were thus at these respective rates per cent.: "B" stock, £79 18s.; "C" stock, £91 16s.; average for the whole, £84 13s. 4d.

As the whole of the £55,400 is applied to capital purposes for the general benefit of the undertaking, while only the nominal capital of £30,000 receives dividend, the public get the capital at 6½ per cent.; although the Company pay a dividend of 12 per cent. As all the "B" stock is now issued, all future sales will be of "C" stock. If, therefore, the initial price is not reduced, the future premiums may be reckoned at 90 per cent. An increase of dividend at the rate of 5s. per cent. on this £30,000 would be £75. If the dividend were reduced from 12 to 10½ per cent., the nominal capital required to raise the same amount of money (£55,400) at the same rate of interest (6½ per cent.) would be £34,285. An increase of dividend at the rate of 5s. per cent. on this would be £85 14s. The consumers, therefore, would not only not be benefited by the reduction, but to this extent they would actually be placed in a worse position than they are now; as, although there might be only the same rate of interest to pay for the capital, there would be a larger amount to pay to the Company.

Six and a half per cent., a trifle more or less, is about the limit to which the public are disposed to go in these sales. Whether the dividend is 10½, 11½, or 12 per cent. makes no difference to the consumer; the public give just so much as will enable them to clear the 6½ per cent., and whatever the dividend may be the consumer has to pay the same rate of interest for the additional capital required. It is but a delusion to suppose that by reducing the dividend the public can get the capital at a lower rate, and it is by no means certain that they would always get it at the same rate, as the public bid more freely for the higher dividends than for the lower. If the initial price were reduced, the public confidence in the rate of dividends would be destroyed; the premiums, consequently, would be very materially reduced.

In regard to interest on capital with premiums and loans combined, the following statement is made:—"The Company are required by their special Act, when and as often as they raise a sum of £50,000 nominal capital, to borrow a sum equal to three-fourths of that amount—viz., £37,500. This they will probably get at 4 per cent.; and, if so, the future capital will stand thus—

Nominal capital	£50,000;	at 12 per cent., £6000
Premium, 90 per cent.	45,000	*nil.*
Loans, three-fourths	37,500;	at 4 per cent., 1500
Total	£132,500	£7500 equal to £5 13s. 4d. per cent.

If the Company are successful in their operations, and able hereafter to pay a larger dividend than 12 per cent., a higher premium might be expected on future sales, and then even this low rate would be reduced still lower."

In reference to the proposed reduction of initial price, some very pertinent statements are made, from which we extract the following:—That these high premiums were obtained on the faith of the statements in the conditions of sale, and the belief on the part of the buyers that Parliament itself, having sanctioned this particular initial price, it might be depended upon, is placed beyond all doubt by the fact that the part of the stock which was entitled to 12 per cent. realized a very much higher premium proportionately than the part which was only entitled to a dividend of 11½ per cent. If, now that the premium has been received and appropriated, the initial price, on the faith of which it was obtained, were to be arbitrarily reduced from 3s. 6d. to 3s., the dividends, instead of being 12 and 11½ per cent. as there represented, would at once be reduced to 10½, and the income of the purchasers and the value of their property be depreciated proportionately, without a possibility of its ever again being worth the price they so recently gave for it. Besides the premiums on the sales of these new shares, a very large number of old shares have been sold in the open market at the same, and even better rates, and all these purchasers would be prejudiced to the same extent. On the faith of the sliding scale, there has been sold in the market over £40,000 of stock, for which nearly £80,000 has been paid. If the initial price were reduced, the premiums on future sales would be reduced in the same, or probably even in a greater proportion, and as dividends are not paid upon premiums, this would decrease the proportion of capital upon which dividends are not paid, and increase the proportion upon which they are paid; so that although there would be a lower rate of dividend to pay, there would be a larger amount of capital to pay upon, and the lower dividend on the larger capital would be the same as the higher dividend on the smaller capital. The consumer, therefore, would not derive any advantage from the lower rate, but the income of the shareholders would be largely reduced thereby. The consumers' interest lies in the price actually charged, and not in the initial price; a reduction of the initial price, unless below the rate actually charged at the time, not necessarily conferring any benefit on the consumers. The sliding scale, with auction clauses, makes the consumers and the shareholders partners, as it were, in the advantages of any improved results, and such results are materially affected by the premiums received on the sale of stock, but a reduction of the initial price would not improve the premiums. The policy that ought to be systematically pursued by both the Metropolitan Board and the Companies, under the present regulations, is to keep down the dividend-bearing portion of the capital, and increase the other portion not only for present, but for future purposes as well, and even though a trifle more had to be paid for it. This would be the wisest course to take, but reducing the initial price has precisely the opposite effect. The shareholders of a company under the sliding scale of dividend and auction clauses have no more interest in raising new capital than the consumers themselves. When new capital must be raised, it is as much to the interest of the company as it is to the consumer to raise no more than is absolutely necessary, and to get for it as large a premium as they possibly can; but whether the dividend is large or small, the one essential point in all cases for securing a good premium is that the dividend shall be safe, dependent only upon the company's powers of earning it. If the dividend is to be arbitrarily cut down every time the company have to apply to Parliament, "selling shares by auction" will be but a farce.

After referring to the difference between the old maximum price and the present initial price, the paper concludes with some remarks on the action of the Metropolitan Board, stating that the Board have been labouring for many years, at great expense both to the Companies and the public, to establish uniformity over the whole Metropolis, but whatever new regulation they establish they are always themselves the first to propose an alteration of it, as in this case. The position of the four Companies now supplying the Metropolis is as follows:—

1. The Commercial Company have the sliding scale, with an initial price of 3s. 9d., and no auction clauses.
2. The Gaslight and Coke Company have the sliding scale, with an initial price of 3s. 9d., and auction clauses.
3. The South Metropolitan Company have the sliding scale, with an initial price of 3s. 6d., and auction clauses.
4. The London Company have no sliding scale, no initial price, and no auction clauses.

The Metropolitan Board are now trying to make a still wider difference between the South Metropolitan and the other Companies.

The second paper referred to gives a full account of the proceedings which led up to the adoption of the sliding scale by three of the Metropolitan Companies in 1875–6; and finally summarizes the matter thus:

In 1875 the Corporation of the City of London and the Metropolitan Board of Works promote a Bill to place all the Gas Companies in the Metropolis, subject to the Act of 1860, under uniform regulations and price, and for this purpose the Bill proposes a sliding scale of dividend with an initial price of 3s. 9d. for all the Companies without distinction.

The Companies oppose the Bill, on the ground that it contains an entirely new principle, and the Metropolitan Board would not keep faith with them if they adopted it.

The Committee question the promoters as to their intentions on this point, and feeling satisfied from their replies that they *bonâ fide* intend to abide by it, approve of the principle on the ground that it would be a final settlement of the differences between the promoters and the Companies, a saving of the costly expenses attendant on the never-ending parliamentary contests, and beneficial to the Companies as well as the consumers.

The next year the South Metropolitan Company, having to apply to Parliament for other purposes, adopt this new principle in their Bill. The Metropolitan Board oppose the application generally, but as respects the initial price say they are precluded by the previous decisions from moving in it themselves—that it is a question specially affecting the consumers—and stand aside to let the Vestries of the district oppose. Ultimately, all the new regulations are imposed upon the Company, but the initial price is reduced from 3s. 9d. to 3s. 6d. for reasons explained.

In 1881 the South Metropolitan Company are again applying to Parliament for further powers, and the Vestries, having gained one reduction of the initial price, stand aside in their turn, and the Metropolitan Board come forward to apply for another, which the Company submit is in direct opposition to all the objects for which Mr. Forster's Committee sanctioned the principle, and the Companies accepted it; and there can be no doubt about the fact that if the Committee had believed that the Metropolitan Board were capable of such proceedings as these they would not have passed the Bill.

This is precisely what the Companies said the Metropolitan Board would do, notwithstanding all the statements of their Counsel to the contrary.

The Metropolitan Board are by these proceedings blindly opposing not only the interests of the Companies, but of the consumers as well, in every possible way. If they succeed in this attempt to reduce the initial price, they will destroy all inducement to the Companies to lower the price hereafter, and if they fail they will have spent the public money in a very unjustifiable way.

NOTES FROM SCOTLAND.

(FROM OUR EDINBURGH CORRESPONDENT.)

EDINBURGH, *Saturday.*

The Supreme Court of Scotland has had to deal with several cases this week which are of importance not only to those immediately concerned with gas-making and cognate manufactures, but also to a large section of the general public. The first in point of order is a case to which I directed attention when it was decided by Lord Rutherfurd Clark, in the Outer House of the Court of Session. It is brought by the Right Hon. John Inglis, Lord President of the Court, and is directed against the Shotts Iron Company, who, having leased the minerals in the lands of Penicuik, &c., proceeded to calcine the ironstone raised from their mines at a spot contiguous to Glencorse, the estate owned by the Lord President. In his action against the Shotts Iron Company his lordship maintained that the sulphurous fumes arising from the calcination, in the course of their transit through the atmosphere, became converted into sulphuric acid, and this, attacking the leaves, which may be called the lungs of the trees, speedily worked mischief. Evidence was produced at great length in support of this, which is really the main contention between the parties, on the one hand, to show that the decaying condition of the trees, especially the coniferæ, was due to the action of the sulphuric acid; and, on the other hand, to prove that the decay and death of the trees were due to entirely different causes, such as planting in damp soil, under deciduous trees, &c. The Outer House Judges and the Inner House Judges, by a majority of two to one, have decided in favour of the Lord President, and have ordered that calcination of ironstone shall not be carried on at the defendants' works at a point nearer than a mile from pursuer's estate, which simply means that the defenders must cease their operations, because the ore is so poor that it would never pay to carry it away to some other district to be calcined. Looking at the evidence on both sides, one is inclined to reach the conclusion that the purpose in putting an end to this calcination does not proceed so much from the actual damage thereby caused, although it must be admitted that sulphurous fumes given off in the immediate neighbourhood of trees cannot fail to prove deleterious, as from

another motive, which is not so clearly upon the surface. It came out incidentally at the very conclusion of the able opinion of the Lord Justice Clerk. In leasing the minerals to the Shotts Iron Company, it seems that the proprietors of the adjoining estates, one of whom is the President's own brother, made it a condition that the ore should not be calcined except at one particular spot, and this is on a narrow strip of ground which projects, so to speak, into the estate of Glencorse, and I rather think it is the irritation consequent upon this provision being carried into effect that has caused bad blood. But the broad question which has been raised in the case is—at what distance do sulphurous fumes become innocuous? The dissenting judge holds that at 400 yards no danger need be apprehended. His brethren on the Scottish Bench are against him on this question, as well as on the other question, which is purely legal—namely, that the calcining at this particular place might be defended even although it caused damage to neighbouring property. It remains now for the House of Lords to say whether or not the minority or the majority is right. There is, however, a point raised which I may at some other convenient time state for discussion—whether sulphuric acid found in certain bottles laid to collect rain water at different parts of the estate was in a free state or in combination. Professor Dewar, of Cambridge, took up the position—although how it is to be defended I do not know—that the sulphuric acid, which was in the proportion of something like 29 parts to the million of water, was in combination with soda, and that this soda was obtained from the bottles in which the water had been collected. This is a question to exercise the chemical faculties of the profession when in want of something better to do. It seems to me to be about as important as the one which long ago excited lively controversy—namely, how many angels can dance on the point of a needle; but with this difference, that the evidence of Professor Dewar is calculated to influence the mind of a judge.

The second case is one between two oil manufacturers as to priority of invention in retorts. Mr. Henderson, of the Broxburn Oil-Works, and Mr. Kennedy, raised an action against the Clippens Oil Company and Mr. William Young, to have the latter interdicted from infringing his patent retort. In defence, the question is asked: Wherein is your patent being infringed?" But pursuers refused, at any rate in the printed pleadings, to satisfy this reasonable demand. From the evidence brought forward it appeared that Mr. Henderson claims novelty and merit for his setting of four retorts, which have a common fire chamber, and for the arrangement of doors upon the fire chamber and upon the bottom of the vertical retort. I do not mean to go into the question here, as I shall supply a fuller report when the point has been decided; but I would in a word say that the defenders deny that Henderson's alleged patent is novel, and they produced evidence—including some eminent London gas engineers, civil engineers, &c.—to prove that anything that was claimed here had been anticipated by other patents which have now expired. The Lord Ordinary has taken time to consider his decision; but it is looked forward to with considerable interest by all engaged in the oil trade.

The third action has reference to a claim for damages arising out of the unfortunate gas explosion which occurred in Henderson Street, Glasgow, on the first day of the present year. There are three claimants for damages, and the ground of action against the Town Council is that the accident occurred through the negligence of the defenders to perform their statutory duty in this respect—that they failed, as Statute Labour Authorities, to maintain the pavement in proper order, and as Gas Commissioners in not listening to the complaints as to a leakage of gas caused, as was supposed, by the subsidence of the pavement. In their capacity as Gas Commissioners the defenders deny fault, and in their other capacity they maintain that Henderson Street is not a public street. Issues have been ordered for the trial of the cause before a jury.

The arrangements are now thoroughly completed for the exhibition of gas apparatus in Aberdeen. The Lower Hall of Marischal College is to be occupied with gas-engines and heating and cooking stoves, and also to exhibit in practical operation the burners of Sugg, Bray, and other makers; while the Upper Hall is to be devoted to the exhibition of apparatus not in action. In this hall the Committee propose to exhibit Swan's electric light, and arrangements are being made to exhibit in the evenings the Brush system of electric lighting from the top of the obelisk in the College Quadrangle.

The annual meeting of the Shareholders of the Brechin Gaslight Company was held on Monday, when accounts were submitted showing that divisible profits had been earned by the Company to the amount of £853. This yielded a dividend of 26s. 6d. per share, as compared with a gross profit last year of £740, and a dividend of 25s. per share. The price of gas remains at 4s. 7d. per 1000 cubic feet. From the report it appeared that the Directors have recently executed considerable alterations on the Company's works, having put in a new and enlarged bench of retorts, besides raising the walls and re-roofing the retort-house, and executing various other improvements. To provide for the expense of these new works, the meeting resolved to offer 26 of their already authorized issue of the Company's stock, at a price not less than £25 per share, to be issued and offered to the present Shareholders.

On Monday last the Shareholders of the Alyth Gas Company held their annual meeting. The report submitted by the Directors showed the affairs of the Company to be in a satisfactory condition. A dividend at the rate of 7 per cent. has been declared, and it was intimated that, after meeting all claims, a balance of £71 10s. 8d. would remain in hand.

The report of the Directors of Coupar-Angus Gaslight Company was submitted to a meeting of Shareholders held on Wednesday. The price of gas is 7s. 1d. per 1000 cubic feet. A dividend at the rate of 7½ per cent. was declared. It was stated that during the year the loss by leakage had been reduced, and that the illuminating power of the gas had been well maintained.

At the annual meeting of the Crieff Gaslight Company on Monday, a dividend of 10 per cent. was declared, and the price of gas was reduced from 6s. 0½d. to 5s. 10d. per 1000 cubic feet.

In some of my former "Notes" I made mention that the Water Commissioners of Dundee were in rather an awkward fix. They had a large deficit, and an apparent expenditure beyond the limits of their income. A meeting of the Commissioners was held on Thursday, when the subject was taken into consideration. After a long discussion it was agreed, on the motion of Mr. Buchan, to appoint a Committee to co-operate with the Police Commissioners in maturing a plan for the funding of the debt, the suspension of the sinking fund, and the readjustment of the basis of assessment. Mr. Buchan pointed out that the total debt of both Boards amounted to £855,998, and that if this were funded there would be a saving per annum on stamps, if money were obtained at 3¾ per cent., that would show a saving of £2162, or a total of £6487. However, if the debt were funded at 3½ per cent., the saving would be £8649, which would represent a reduction of 2d. from the police assessment and of 3½d. from the water-rates.

On Saturday last the new water supply for Grantown was publicly turned on. The water is derived from a spring about three miles from the town; this spring gives a supply of 68 gallons per head of the population every 24 hours. Near the spring a concrete tank has been formed, capable of containing 5000 gallons. Now that the scheme is completed, Grantown will possess one of the finest supplies of water in the North of Scotland.

(FROM OUR GLASGOW CORRESPONDENT.)

GLASGOW, *Saturday*.

A meeting of the Jedburgh Gas Company was held on Wednesday last week, when a dividend of 10 per cent. was declared, and a sum of £250 was added to the reserve fund. Some sharp discussion took place on the course pursued by the Company in refusing to entertain the question of a reduction in the price of gas. The feeling in the town against the present policy of high rates is said by a local paper to be so strong now that the public are prepared to countenance any scheme of relief. One of the largest consumers has formally intimated to the Directors his intention to provide an independent supply of gas, and that the public will have the offer of the use of it. If this is carried there will then, according to the same paper, be cheap gas in Jedburgh.

The Shareholders of the Galashiels Gaslight Company held their 47th annual general meeting last Wednesday—Mr. Frank Rutherford in the chair. The report of the Directors, together with the financial statement, was submitted and approved of. As the gas undertaking of Galashiels is a most successful one, and interesting in a variety of ways, partly from the fact that the price at which the gas is sold is still the lowest charged in Scotland—3s. 4d. per 1000 cubic feet—I shall revert to the subject more in detail in next week's "Notes."

Langholm is another of the towns in the South of Scotland, where the annual meeting of the Gas Company has just been held, with the result that a dividend of 5 per cent. was declared, and a resolution passed that the price of gas remain at 5s. 10d. per 1000 cubic feet. The position of the Company is reported to be highly satisfactory; but if it is the case—as is alleged—that the leakage and unaccounted-for gas amount to 33·47 per cent., there is certainly room for improvement, and for making the undertaking very much more satisfactory.

Under the chairmanship of Mr. William Martin, the annual meeting of the Kirkcudbright Gas Company has been held, at which it was resolved to pay the usual dividend of 7½ per cent., and to reduce the price of gas from 7s. 11d. to 7s. 6d. per 1000 cubic feet.

Dumfries has turned over a new leaf, of a very marked character, in respect to its gas supply undertaking. Last year 10d. per 1000 feet was taken off the price of the gas, and it is now discovered that the state of affairs arrived at by the Corporation Gas Committee is such that they can confidently recommend a reduction of a similar amount, for the ensuing year—in other words, to bring down the price from 5s. to 4s. 2d. per 1000 feet. The Committee also recommend that large consumers have a special rate of 3s. 11½d. made for them. But that is not all, for they recommend that an addition of £50 be made to the salary of Mr. Malam, the Manager, and lesser amounts to other officials. These recommendations and other matters will be brought under the consideration of the Town Council, as the Gas Commission, next week.

A dividend of 8 per cent. was agreed upon by the Kilwinning Gaslight Company at their annual meeting, held on the 5th inst., and it was resolved to continue the price of gas at 4s. 2d. per 1000 feet. Mr. T. Fulton was re-elected Chairman of the Directors, and Messrs. Hugh King and Sons were re-elected Secretaries and Treasurers.

The annual meeting of the Ayr Gas Company was held on Wednesday—Dr. Ronald, Chairman of the Company, presiding—when the Directors' report was submitted and adopted. It stated that the average illuminating power of the gas supplied during the year had been 26 candles, and the price 5s. per 1000 cubic feet—the lowest price at which gas has ever been supplied in Ayr. The Directors recommended a dividend at the same rate as last year—namely, 7½ per cent., free of income-tax. The Manager reported that the works had been maintained in excellent repair. Dr. Ronald, Mr. J. B. Paton, and Mr. R. D. Murdoch were unanimously re-elected Directors.

In accordance with the recommendation of the Directors, the Bothwell and Uddingston Gaslight Company have declared a dividend of 7½ per cent. with a bonus of 2½ per cent. upon the paid-up capital (£9000). The annual meeting was held last Monday—Dr. Bruce Goff, Chairman, presiding. No change was made in the price of gas, and Dr. Muirhead and Mr. Scott were re-elected Directors.

It has been resolved by the Directors of the Airdrie Gas Company to reduce the price of gas from 4s. 2d. to 3s. 9d. per 1000 cubic feet.

The annual meeting of the Newmilns New Gaslight Company was held last Wednesday evening—Bailie M'Culloch in the chair. The report by the Directors, which recommended a dividend of 5 per cent. upon the profits of last year's transactions, was adopted.

Last year's total revenue from the gas-works department of the Port-Glasgow Town Council was £4086 7s., and the expenditure for gas coal was almost £1400.

The Glasgow pig iron warrant market has been steady this week, and the fluctuations have been within small compass, while only a limited amount of business has been reported. There is still some talk about reducing the number of furnaces in blast, but it does not seem to be likely to result in definite action. At the close yesterday there were sellers asking 47s. cash and 47s. 1½d. one month, and buyers offering ½d. per ton less.

There is a fair amount of shipping going on in the coal trade, and a number of good orders have lately been closed on home account.

THE TIPTON LOCAL BOARD NEW GAS-WORKS.—The Horseley Company, Limited, of Tipton, have obtained the contract for the whole of the iron-work and apparatus required for the erection and completion of the new gas-works at Tipton. The total weight of iron in the entire apparatus is about 700 tons. The works will, in the first instance, be capable of producing about 60 million cubic feet of gas per annum, and the arrangements will admit of the capabilities being doubled with the least possible outlay. They will include all the latest improvements in gas making, and it is expected they will be in operation in March next.

THE GAS AND WATER SUPPLY OF TREDEGAR.—At the meeting of the Tredegar Local Board on Wednesda y last, the question of the desirability of the Board purchasing the local gas and water works was under consideration. The Clerk read some correspondence that had taken place on the subject, from which it appeared that the Gas Company had made arrangements to supply a district beyond the limits of the Local Board district, and that as the Board had no power to supply gas and water beyond such limits, it would be necessary to proceed to annexation, so as to include the part alluded to. A communication received from the Local Government Board intimated that this could not be accomplished during the present parliamentary session. It was ultimately resolved to send a petition to the Local Government Board, with a view to annex the district so as to bring it within the required limits.

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